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Summary of Emergency Troubleshooting Assistance

Research Triangle Inst.
Research Triangle Park, NC

Prepared for

Environmental Protection Agency
Research Triangle Park, NC

May 78

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U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Waste Management
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

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16. ABSTRACT

When dealing with atmospheric pollution, it is necessary to amass, catalog, sort, evaluate, and perform calculations upon large volumes of data. To assist state and local air pollution control agencies dealing with these large volumes of data, EPA has developed and distributed the Comprehensive Data Handling System (CDHS). EPA also maintains and supports the CDHS subsystems including troubleshooting of any computer program problems. This report is a compilation of those troubleshooting activities under this contract.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Computer Programs Computer Software Data Processing Air Pollution Data Handling Software Troubleshooting Computer Systems Programs Software Support	CDHS AODHS-II EIS/P&R Atmospheric Pollution SAROAD NEDS	

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by

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Contract No. 68-02-1386
Task Order No. 16

EPA Project Officer: Lloyd M. Hedgepeth

Prepared for

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Office of Air and Waste Management
Office of Air Quality Planning and Standards
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The work has been conducted under the direction of Mr. Lloyd M. Hedgepeth, who is the EPA Project Officer for the contract.

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1. INTRODUCTION

This task was initiated on December 30, 1975 with the objective of providing the users of the Comprehensive Data Handling System (CDHS) with emergency troubleshooting assistance. Upon initiation of this effort, RTI and NADB established procedures to be followed in handling troubleshooting activities. A flow diagram of these procedures is shown in Figure 1.

In providing this troubleshooting assistance RTI investigated 403 reported problems and resolved 391 problems which required 21 updates to EIS/P&R and 20 updates to AQDHS-II. Table 1 shows a breakdown of problems by subsystem and priority. Chapter 2 is a summary of the non-trivial problems reported concerning AQDHS-II while Chapter 3 is a summary of the non-trivial problems reported concerning EIS/P&R.

TABLE 1

SUMMARY OF ALL REPORTED CDHS PROBLEMS

	#REPORTED	#RESOLVED
AQDHS-II		
Low Priority	11	10
Medium Priority	16	15
High Priority	170	170
Total	197	195
EIS/P&R		
Low Priority	10	7
Medium Priority	33	26
High Priority	163	163
Total	206	196

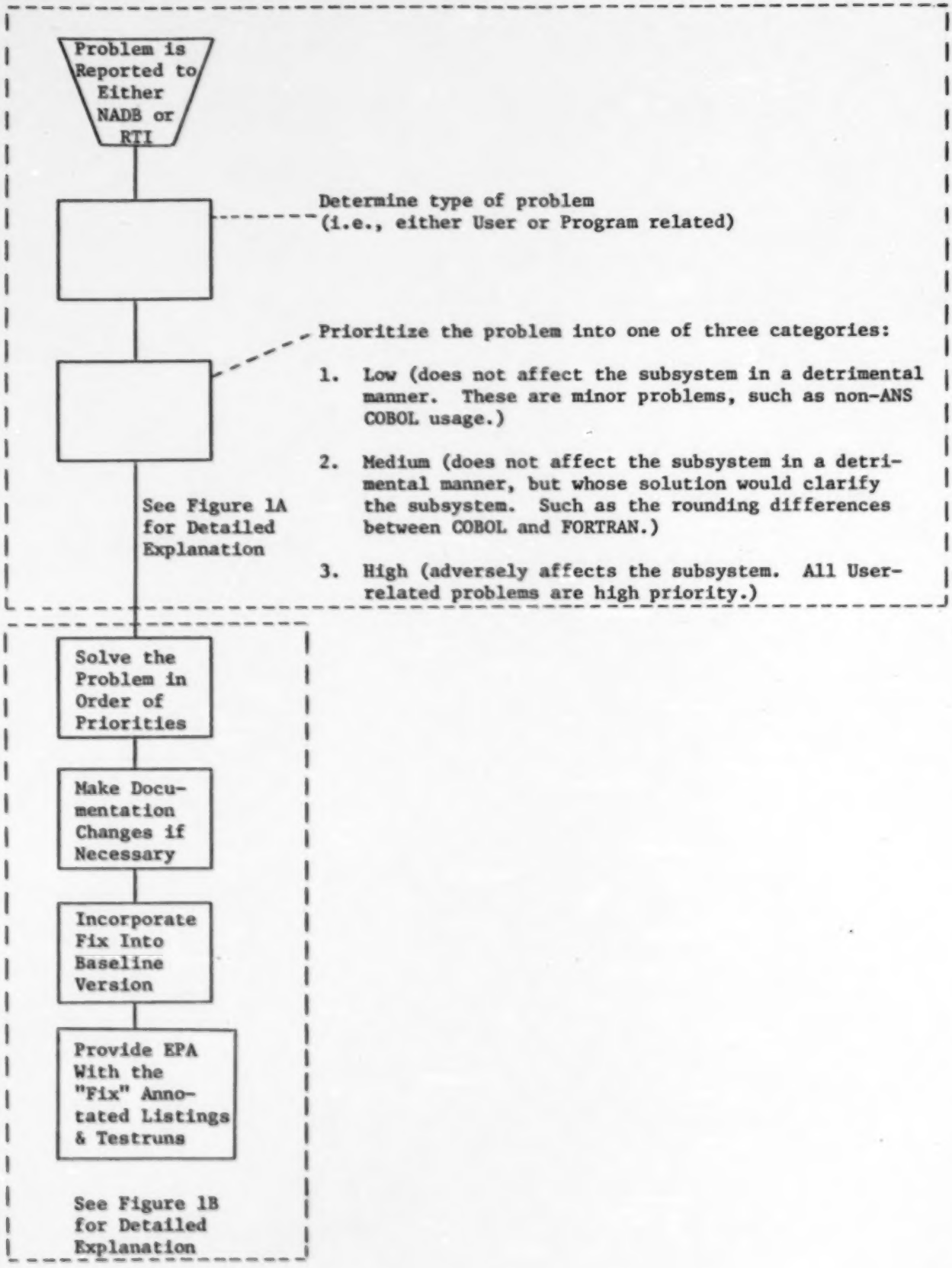
Problem is Reported to Either NADB or RTI
Determine type of problem (i.e., either User or Program related)
Prioritize the problem into one of three categories:
1. Low (does not affect the subsystem in a detrimental manner. These are minor problems, such as non-ANS COBOL usage.)
2. Medium (does not affect the subsystem in a detrimental manner, but whose solution would clarify the subsystem. Such as the rounding differences between COBOL and FORTRAN.)
3. High (adversely affects the subsystem. All User-related problems are high priority.)
See Figure 1A for Detailed Explanation
Solve the Problem in Order of Priorities
Make Documentation Changes if Necessary
Incorporate Fix Into Baseline Version
Provide EPA With the "Fix" Annotated Listings & Testruns
See Figure 1B for Detailed Explanation

FIGURE 1. TROUBLESHOOTING PROCEDURES

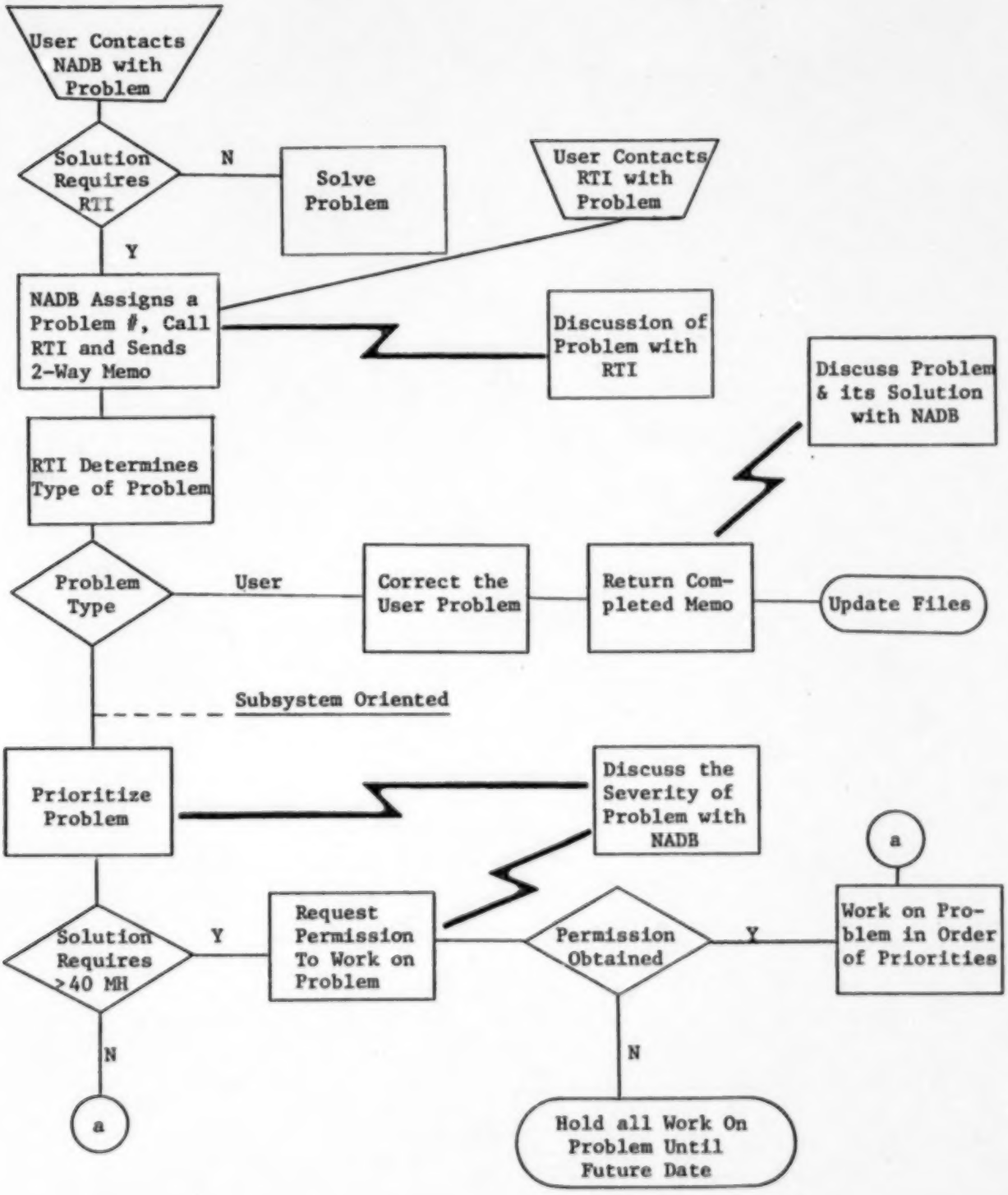
User Contacts NADB with Problem
Solution Requires RTI
N
Solve Problem
User Contacts RTI with Problem
Y
NADB Assigns a Problem #, Call RTI and Sends 2-Way Memo
Discussion of Problem with RTI
Discuss Problem & its Solution with NADB
RTI Determines Type of Problem
Problem Type
User
Correct the User Problem
Return Completed Memo
Update Files
Subsystem Oriented
Prioritize Problem
Discuss the Severity of Problem with NADB
a
Solution Requires >40 MH
Y
Request Permission To Work on Problem
Permission Obtained
Y
Work on Problem in Order of Priorities
N
N
a
Hold all Work On Problem Until Future Date

Figure 1A

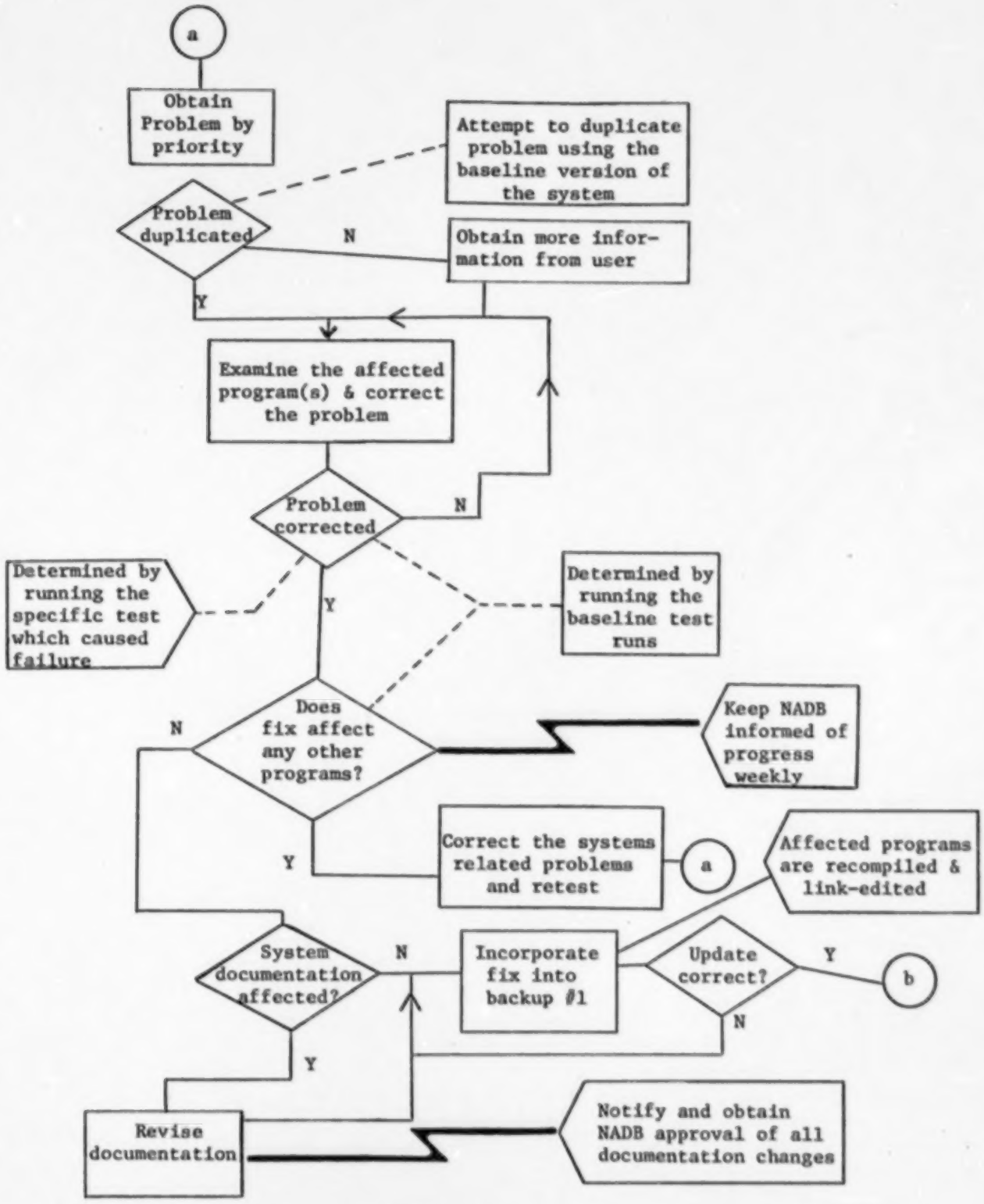
a
Obtain Problem by priority
Attempt to duplicate problem using the baseline version of the system
Problem duplicated
N
Obtain more information from user
Y
Examine the affected program(s) & correct the problem
Problem corrected
N
Determined by running the specific test which caused failure
Y
Determined by running the baseline test runs
Does fix affect any other programs?
N
Keep NADB informed of progress weekly
Y
Correct the systems related problems and retest
a
Affected programs are recompiled & link-edited
System documentation affected?
N
Incorporate fix into backup #1
Update correct?
Y
b
N
Y
Revise documentation
Notify and obtain NADB approval of all documentation changes

Figure 1B

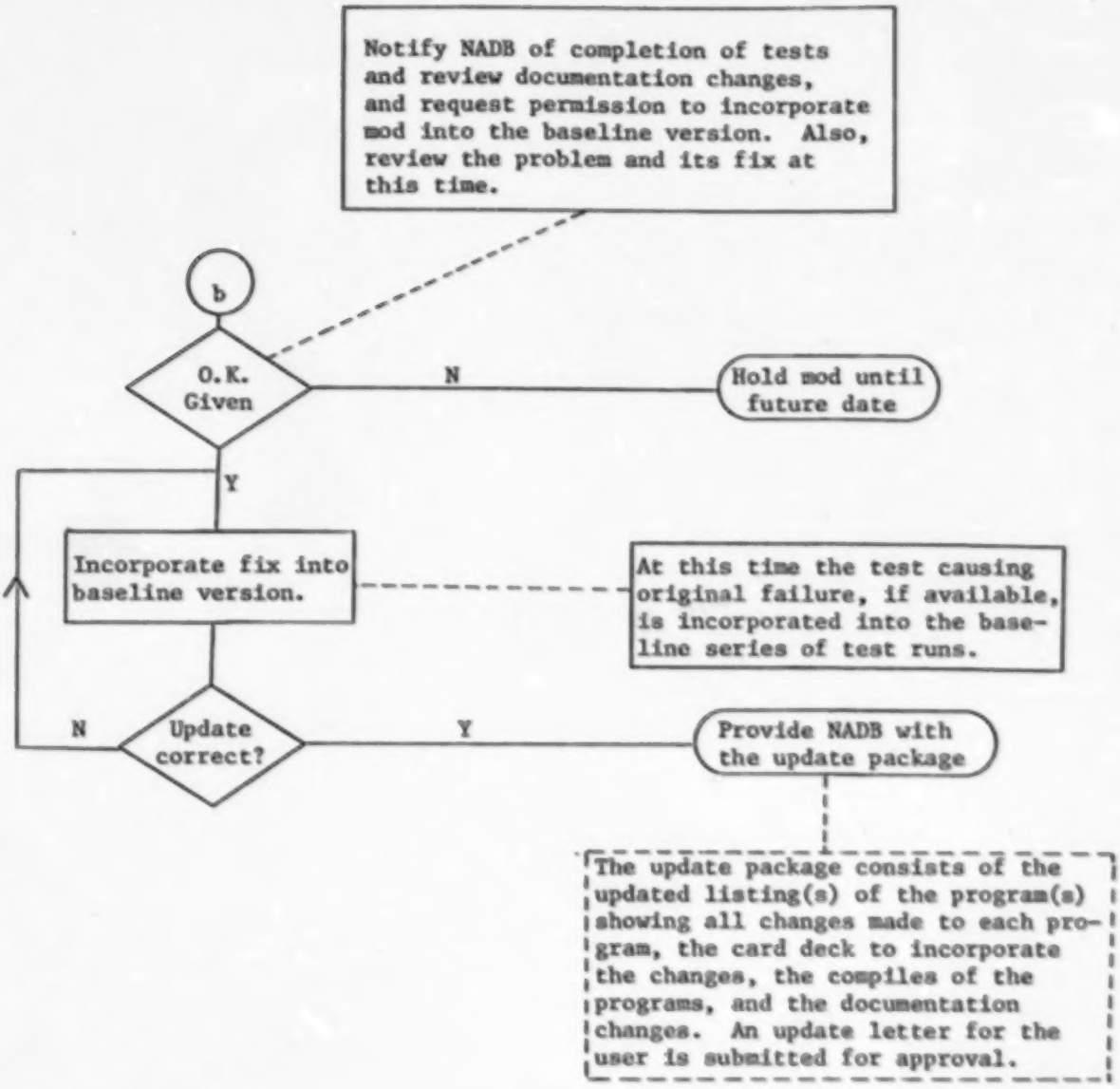
Notify NADB of completion of tests and review documentation changes, and request permission to incorporate mod into the baseline version. Also, review the problem and its fix at this time.
b
O.K. Given
N
Hold mod until future date
Y
Incorporate fix into baseline version.
At this time the test causing original failure, if available, is incorporated into the baseline series of test runs.
N
Update correct?
Y
Provide NADB with the update package
The update package consists of the updated listing(s) of the program(s) showing all changes made to each program, the card deck to incorporate the changes, the compiles of the programs, and the documentation changes. An update letter for the user is submitted for approval.

Figure 1B (Cont.)

2. PROBLEMS - AQDHS-II

2.0 Introduction

This section contains two descriptions of AQDHS-II problems reported under this contract. Section 2.1 provides a review of all problems reported on two-way memos from the EPA Project Officer. The problems are described in chronological order with the problem numbers corresponding to the two-way memo numbers assigned by the EPA Project Officer. Information on the problems has been filed at RTI and EPA by these problem numbers. Some problems have been reported by more than one user. In such cases, each problem reported by two-way memo is listed separately, and there are cross references to similar problems. Whenever a problem resulted in an update, the update number is given.

Section 2.2 gives information on AQDHS-II updates that were issued as a result of problems reported under this contract. The update number and data are given, along with a brief description of the problem involved. Each program affected by the update is listed, and the problem numbers from Section 2.1 are referenced.

2.1 Chronological Report of AQDHS-II Problems

There were forty-one AQDHS-II problems reported by two-way memos from the EPA Project Officer under this contract. The problem numbers in Section 2.1 refer to the numbers assigned by the EPA Project Officer on two-way memos. Additional information on the problems can be found in RTI and EPA files under these problem numbers. Each reporting of a problem by two-way memo is listed and references are made to numbers of related problems. If a problem resulted in an AQDHS-II update, a reference to the update number is given. Further information on the updates can be found in Section 2.2.

Section 2.1 uses a problem/solution format to describe the troubleshooting activities.

1. *The size of the fields printed as final statistics by the AXCONVRT program was too small.*

   The program AXCONVRT was modified to allow larger file count statistics to be printed. The remaining programs in the system were examined for the problem, but no action was warranted. The modification was distributed in AQDHS-II Update 13.

2. *A user reported a problem with the parameter file counter. When those programs that use both the Parameter Code Key file and the Parameter Description file were run, the programs ended with the error message 'DESCRIPTION FILE DOES NOT MATCH PARAMETER CODE KEY FILE - RUN ABORTED'.*

   The user was running the sentinel program NXSENTNL whenever creating or updating his parameter file. The NXSENTNL program adds a sentinel (end-of-file) record to the parameter code key file. This flagged file is only necessary for input to the statistical analysis program, DXSTATIS. This flagged parameter code key file was then used in all programs. The programs other than DXSTATIS effectively count the number of records in each of the two parameter files (e.g., parameter code key file and the parameter code description file) to determine if the correct files are being used. The sentinel record created an inbalance which caused the error message to be printed. A system change proved unnecessary after having examined this situation. The user was then instructed as to the proper use of the sentinel program.

3. *A user encountered difficulty in the proper coding of a repeating data field on the retrieval program and reported a difficulty in the statistical averages printed in the reports. Both problems proved to be related to the decimal point indicator.*

   A letter was written to the user explaining the correct method for using repeating data fields and decimal point indicators in retrievals. A revision to remove the decimal point indicator from the AQDHS-II key should be considered.

4. *Statistics in the COBOL programs, such as the mean value, are computed and then truncated rather than rounded. These statistics are then printed on reports and differ from those computed in the FORTRAN program DXSTATIS.*

   The statistics calculated by the COBOL program EXRPTLST (detail list) were found to differ from those calculated by the FORTRAN program

DXSTATIS (statistics program). FORTRAN uses rounding in the division operation needed to calculate the mean for a set of readings while COBOL uses truncation. The COBOL program was modified to use the rounding technique. The actual rounding routine had to take into consideration the decimal point indicator; that is, if the values have a decimal point of zero, the mean value, which has four decimal places, is increased by .5, and then truncated to zero decimal places to be printed on the report. This modification was distributed in AQDHS-II Update 20.

5. *In running the AQDHS-II file maintenance program, the user attempted to create an already existant data set.*

   A letter was sent to the user to explain the proper use of the AQDHS-II procedures; that is, when running a procedure that creates a data set, either a new name must be used for the data set each time or the existing data set must be deleted prior to each run.

6. *A user reported that the detail list program sometimes shows a maximum value higher than the raw data values.*

   The routine for calculating maximum value in EXRPTLST was corrected to insure that the correct value was determined for each row, column, and page. The modification was distributed in AQDHS-II Update 20.

7. *The maximum value check in TXTREDIT should be a nonsuppressible warning message and should comprise all those parameter-unit code combinations included in the SAROAD maximum value check.*

   The maximum value table in TXTREDIT was expanded to include all those parameter-unit code combinations from the SAROAD check. The associated message is a nonsuppressible warning. The modification was distributed in AQDHS-II Update 20. See problem 39.

8. *The program AXCONVRT was creating SAROAD transactions and new AQDHS-II master file records for old master file records containing all null values.*

   A modification was made to AXCONVRT to allow no SAROAD transactions or new AQDHS-II master file records to be output with only null values. A final statistical message was added to show the number of null value transactions suppressed. This modification was distributed in AQDHS-II Update 14.

9. *A user reported a problem with monthly and quarterly transactions that might be occuring in CXCONVRT.*

   The program CXCONVRT was thoroughly examined and tested, verifying that the method of converting monthly and quarterly transactions was correct. The problem could not be reproduced on the NADB baseline system.

10. *TXTREDIT edits the start hour to verify that it is numeric and not greater than 23; however, no check is made to validate it with respect to the sampling interval.*

    A start hour/sampling interval table was added to TXTREDIT to allow a check for start hour with respect to sampling interval. The modification was distributed in Update 20.

11. *A user reported a problem in running the retrieval program. He had selected a retrieval on the field IDENT-KEY but had retrieved more records than he had wanted.*

    The user was shown how to hold the field KEY-3 constant while selecting an interval for the rest of the IDENT-KEY field, thus allowing him to retrieve only those records that he desired.

12. *A request was made to print the minimum detectable value in the header of the report programs. It was also requested that the number of observations less than the minimum detectable on the statistics report be printed. This information is also desirable for troubleshooting assistance.*

    A modification was made to output the minimum detectable value in the report headers of SXPRINTS and EXRPTLST. In SXPRINTS, the number of observations less than the minimum detectable value and the number of times that half the minimum detectable value was substituted were added to the report. These modifications were distributed in AQDHS-II Update 20.

13. *Users requested a merge program to allow them to combine two separate AQDHS-II master files. It was also requested that a procedure be provided to run this merge program.*

    A new merge program AXMERGE and a procedure AQSMERGE were distributed in AQDHS-II Update 14. These allow users to archive data. By keeping the present year's data on the current master file and previous years' data on an old master file, they can reduce costs of running the system. The archived data can then be recombined with the current data when needed by using the AXMERGE program.

14. *A user reported that he received massive rejections from TXTREDIT when initially creating his master file.*

    The errors were examined and found to be valid rejections. The user was notified of this, and was instructed to correct his data, and/or site code and parameter code files as necessary.

15. *A user experienced duplicate data rejections.*
The data in question was studied and found to be miskeypunched. The user was notified of this.

16. *It was found that the UNIVAC computers could not handle the degree of nesting and the multiple negations in the TXTREDIT program.*
The lengthy logical "IF" statements in TXTREDIT were broken up. This could be executed by placing part of the statement in a separate paragraph and replacing that part of the original statement with a perform new paragraph phrase. Similiar modifications were made in FXFILMNT.
These modifications were distributed in AQDHS-II Update 15.

17. *Update 14 allowed data with leading spaces to be passed to numeric fields in the AQDHS-II master file. This resulted in ABENDS in programs that required numeric data.*
The TXTREDIT program was corrected to replace leading spaces with zeros in the output transactions. The modification was distributed in AQDHS-II Update 15.

18. *A master file sequence check was added in Update 14. Some users then discovered that their old files were out of sequence or contained duplicate records.*
A program was written to sort the master file in the correct sequence and create a file of duplicate records. This program was used to correct the users' files and while not a part of the AQDHS-II system, has been distributed to any user upon request. See problems 24, 27.

19. *It was economically desirable to remove the retrieval language skeleton and the retrieval copy numbers from the AQDHS-II test library and to place them in the source library. At the same time, it was desirable to incorporate the test data into the expandable test run job streams, which would be added to the baseline system. This would decrease the number of partitioned data sets needed for the AQDHS-II system.*
AQDHS-II Update 18 incorporated the retrieval copy members and language skeleton into the source file. In AQDHS-II Update 20 the test runs were expanded and revised and placed into the baseline system, The test run series has been made available to users on an optional basis, for trouble shooting and system test purposes.

20. *For economic reasons, the retrieval procedure was modified to use the skeleton retrieval program and the copy members from the source file rather than from the test data set.*

The modification to the retrieval procedure AQSRTRVR to use the source file was distributed in AQDHS-II Update 18.

21. *Procedures were requested to allow for a 'standard' retrieval to be stored in the load library and for execution of the retrieval from the load library, once stored. This would reduce the cost of running retrievals with 'standard' specifications.*

    The procedure AQSRTRCL allows for a retrieval to be created, compiled, and link-edited into the load library. The procedure AQSRTRGO executes a retrieval program as soon as it is stored in the load library. These procedures were distributed in AQDHS-II Update 20.

22. *Users requested that the procedure for deleting master file records should be modified to make it easier for the user to delete fields or records without having to manually submit deletes to SAROAD.*

    FXFILMNT was modified so that a delete transaction changes all valid data readings to null value (all 9's) and changes the status flag to "C." AXCONVRT was modified not to output any AQDHS-II master file records with all null values. AXCONVRT also reports the number of deleted master file records processed in this method. The deleted fields or records are transmitted to SAROAD as changes. All users were instructed to request that EPA process their change data using the SAROAD "Deletes" option. These modifications were distributed in AQDHS-II Update 17.

23. *A user reported a problem with AXCONVRT. When he was generating SAROAD transactions with hourly data for the second half of the day, with no first half day present, a start hour of '00' was generated rather than the correct start hour of '12'.*

    AXCONVRT was modified to generate the correct start hour of '12' for the SAROAD transaction containing only the second half day of hourly data. The modification was distributed in AQDHS-II Update 16.

24. *A user encountered an ABEND of OC1 when running the master file maintenance program FXFILMNT on a master file that had out-of-sequence records.*

    The user had recently incorporated Update 14 which checks for master file sequence. When he attempted to update his master file using the file maintenance program FXFILMNT, he found that his master file was out-of-sequence. As a result, the master file sort program (see problem 18, 27) was provided to the user to sort his master file into the proper collating sequence.

25. *A problem occurred in TXTREDIT after AQDHS-II Update 14. When only one parameter is coded for SAROAD Type 2 data that information is duplicated in the second parameter field. When a transaction was miskeypunched with the data all shifted one column to the right, several error messages were generated, and the program entered into an infinite loop.*
TXTREDIT was modified to alleviate the "bug" which caused the infinite loop and to eliminate erroneous internal transactions from being generated when only one parameter was coded. These modifications were distributed in AQDHS-II Update 16.

26. *It was requested that programs and procedures to execute those programs be made available to produce detail listing reports of the site file, the parameter file, and the standards file.*
New programs PXSITE, PXMETHOD, and PXSTNDRD and new procedures AQSPSITE, AQSPMETH, and AQSPSTDS were added in AQDHS-II Update 18 to list the site, parameter, and standards file.

27. *A user encountered a problem with duplicate records on his master file. When he ran AXCONVRT on the file, a SAROAD transaction was created exclusively for the first record.*
The user was informed that after AQDHS-II Update 14 was incorporated into his system, duplicate records, and out-of-sequence records would not be allowed on the AQDHS-II master file. He was also shown how to correctly use FXFILMNT and AXCONVRT. The master file sort program was then provided to the user (see problem 18, 24).

28. *A user reported a sequence problem with the output file of AXMERGE.*
The sequencing routine for the output file in AXMERGE was corrected, and the modification was distributed in AQDHS-II Update 17.

29. *A user reported that he had problems with FORM 2 data when using multiple parameters. When only the first parameter had a data value, this value was duplicated for the other parameters.*
The program TXTREDIT was modified to eliminate erroneous transactions from being generated when only one parameter was used. This modification was distributed in AQDHS-II Update 16 (see problem 23).

30. *A user reported that TXTREDIT rejected composite transactions by duplicate composite period rather than duplicate composite type, as stated in the documentation.*

TXTREDIT was modified to reject duplicate composite types rather than duplicate composite periods, and the resulting modification was distributed in AQDHS-II Update 20.

31. *A user reported an OC7 ABEND when running the statistical list program SXPRINTS.*

    The problem could not be duplicated, and the user was requested to compile and link-edit his programs; consequently, the problem was resolved.

32. *A user encountered a problem with his file upon submitting it to the EPA regional office.*

    The user's file was corrected to allow him to regenerate the SAROAD transactions, so that the SAROAD transactions could be sent to the regional office.

33. *It was desirable to modify CXCONVRT to allow for the list of valid transactions to be optionally suppressed.*

    An option was added to CXCONVRT which gives the user the capability of printing or not printing his valid transactions. The default option lists only those transactions which are in error. This modification was distributed in AQDHS-II Update 20.

34. *A user reported that his AQDHS-II programs were abending with an OC1 since incorporating Update 18.*

    The user had failed to link-edit the programs distributed in AQDHS-II Update 18 and was advised to do so. Upon compiling and link-editing his revised programs, the user reported that his problems were resolved.

35. *The modifications made in AQDHS-II Update 18 to the program IXSLDAVG included a recursive subroutine call which would not run on UNIVAC computers.*

    Upon further examination, it was found that all programs modified in AQDHS-II Update 18 had the recursive subroutine call. The call was removed from the programs IXSLDAVG, LXLNGPRC, EXRPTLST, and RXRETRVR. These modifications were then distributed in AQDHS-II Update 20.

36. *Modifications made in AQDHS-II Update 18 included nested "IF" statements that were too complex to be handled on the UNIVAC computers.*

    The programs IXSLDAVG, LXLNGPRC, and EXRPTLST were found to have excessively complex "IF" statements. The complexity of the logical "IF" statements was reduced so that the programs could compile on the UNIVAC. The resulting modifications were distributed in AQDHS-II Update 20.

37. *In modifications made in AQDHS-II Update 18, there was a failure to close an option file which caused a problem on the UNIVAC computers.*
The programs IXSLDAVG and EXRPTLST were modified to allow for closing the option file. The modifications were distributed in AQDHS-II Update 20.

38. *No titles were printed for the site code detail list report in the PXSITE program.*
A title line was added to the site code detail list report in PXSITE. This modification was distributed in AQDHS-II Update 20.

39. *A user had a problem with valid data being rejected because it was greater than the maximum value. The maximum value check should be made a warning.*
The program TXTREDIT was modified to include all SAROAD maximum value checks and to make the associated message a warning level error. This modification was distributed in AQDHS-II Update 20. See problem 7.

40. *Modifications made to the AQDHS-II system to allow it to run on a Honeywell computer should be investigated with all such possible modifications being incorporated into the baseline system.*
Time did not allow for completion of this task prior to the end of this contract.

41. *A user reported problems with his SAROAD data being rejected upon its submission to the regional office. The rejections were caused by invalid site and parameter codes.*
Upon examination, it was found that the invalid codes actually occur on the user's site and parameter files. This allowed the invalid data to be added to the master file. The user was advised to delete the invalid code from his site and parameter files and then correct the data on the master file before regenerating SAROAD transactions.

2.2 AQDHS-II Updates Issued During This Contract

Updates 11 thru 20 were issued for the AQDHS-II system during the course of this contract. Most of the updates resulted from troubleshooting. Information on these updates are given in Table 2, including date, programs involved, and a brief description of the problem or change. Those problems corresponding to two-way memos are referenced by the problem numbers used in Section 2.1. Additional details of the problems can be found in Section 2.1.

TABLE 2

SUMMARY OF THE AQDHS-II UPDATES
ISSUED DURING THIS CONTRACT

Update Number	Date	Programs	Problems
11	1/12/76	CXCONVRT DXSTATIS	The modifications in Update 11 were done by another contractor and did not involve any two-way memos.
12	1/26/76		The procedure AQSDANAL was modified to agree with changes made to DXSTATIS in Update 11. No two-way memos were involved.
13	2/2/76	AXCONVRT	The size of statistical fields printed was increased. See problem 1.
14	10/13/76	TXTREDIT FXFILMNT AXCONVRT AXMERGE Procedures Test Jobs	Many of modifications issued in Update 14 were performed by another contractor. However, AXCONVRT was modified not to output null transactions (problem 8) and the new program AXMERGE corrected problem 13.
15	12/10/76	TXTREDIT FXFILMNT	Problems created by Update 14 were corrected. See problems 16, 17.
16	12/30/76	AXCONVRT TXTREDIT	Hourly data generation was corrected in AXCONVRT (problem 23). TXTREDIT was modified to correct parameter information (problems 25, 29).
17	2/23/77	FXFILMNT AXCONVRT AXMERGE	The delete record process was modified in FXFILMNT and AXCONVRT (problem 22). The sequencing routine in AXMERGE was corrected (problem 28).

TABLE 2 (CONTINUED)

Update Number	Date	Programs	Problems
18	3/28/77	IXSLDAVG EXRPTLST LXLNGPRC RXRETRVR PXSITE PXMETHOD PXSTNDRD Procedures Libraries	Many of the modifications in Update 18 were performed by another contractor. However, changes were made to the system to allow for fewer libraries (problems 19 and 20), and for new print programs PXSITE, PXMETHOD and PXSTNDRD (problem 26).
19	5/19/77		New compile and link edit procedures were issued. No AQDHS-II two-way memos were involved.
20	9/30/77	Test Runs Copy Members AXCONVRT AXMERGE CXCONVRT DXSTATIS EXRPTLST FXFILMNT HXTABLE1 IXSLDAVG LXLNGPRC MXSENTNL NXSENTNL PXSITE RXRETRVR SXPRINTS TXTREDIT Procedures	Update 20 was a general update to allow for negative data. The following problems were also corrected. Modifications made in Update 18 that would not run on the UNIVAC computer were corrected in IXSLDAVG, EXRPTLST, LXLNGPRC and RXRETRVR (problems 35, 36, 37). A title line was added to the report in PXSITE (problem 38). A no-print option was added to CXCONVRT (problem 33). New procedures were added to allow for the storage and execution of standard retrievals (problem 21). Minimum detectable information was added to the SXPRINTS report header (problem 12). In TXTREDIT, the maximum value check was expanded (problems 7 and 39), the start-hour check was improved (problem 10) and the handling of composite data was improved (problem 30). In EXRPTLST, the mean value computation was improved (problem 4), the maximum value routine was corrected (problem 6), and the minimum detectable value was printed on the report header (problem 12). The test run series was added to the baseline system (problem 19).

3. PROBLEMS - EIS/P&R

3.0 Introduction

Problems relating to the EIS/P&R system are described in Section 3. All those problems reported on two-way memos by the EPA Project Officer are listed in Section 3.1, in order by the problem numbers assigned on those memos. The problem number is used for filing reports at RTI and EPA. Separate descriptions are presented for each problem reported by two-way memo, even if the problem had been reported earlier by another user. Problem numbers are given as references to similar problems.

EIS/P&R updates issued during the time period of this contract are shown in Section 3.2. The date of update, programs involved, and problems solved are given. The problem numbers as referenced in Section 3.1 are shown for the problems.

3.1 Chronological Report of EIS/P&R Problems

Section 3.1 describes the fifty-five problems reported by two-way memos from the EPA Contract Officer under this contract number. The problems are listed in chronological order according to the two-way memo problem number assigned by the EPA Project Officer. Additional information on the problems can be found in RTI and EPA files under these problem numbers.

Those problems which resulted in EIS/P&R updates show the update number. Section 3.2 contains information by update number for the EIS/P&R system. Each two-way memo problem is listed, including those which duplicate earlier problems. The numbers of related problems are referenced.

The descriptions in Section 3.1 are presented in problem/solution format.

1. *A user reported a problem with SXMSTSRT, the master file sort program. The program abended with an OC4 completion code.*
   The problem was traced to the IBM VS compiler. This compiler has a bug related to sorting variable length records. IBM has not reported a fix. The user's file was successfully sorted with a program compiled on an IBM OS computer. A temporary version of the program using fixed length records for sorting has been tested on a VS machine and will be sent to those users reporting this problem until the program is reissued with the modifications being performed by the GSA contractor, Potomac Research Incorporated (PRI). See also problems 48 and 52 of EIS/P&R.
2. *It was reported that the master file maintenance program FXFILMNT was not zeroing the emission estimates field after deletion of a first SCC and prior to a recalculation of the emission estimates.*
   A modification was made to FXFILMNT to correct the emission estimate calculation. This modification was distributed in EIS/P&R Update 10. See problems 8, 13.
3. *A user reported that the error messages in FXFILMNT were poorly worded and misleading.*
   The error messages in FXFILMNT were discussed in Volume 1, #2 (March, 1976) of the CDHS USERS BULLETIN, however, no program modifications were performed. RTI has been told that the program is being rewritten under a GSA contract with PRI. See also problems 12 and 44.
4. *A user reported a problem with the emission factor transaction generator program EXTRNGEN. The program was generating bad transactions when the emission factor did not appear in the SCC versus emission factor file.*
   The program EXTRNGEN was modified so that it did not destroy pollutant ID's at random or generate bad transactions. This modification was distributed in EIS/P&R Update 9. See problem 8.
5. *Two problems were reported by a user. First, there was a problem with the delete transactions 11D and 21D in the file maintenance program FXFILMNT. Second, the transaction generator program EXTRNGEN was not generating transactions when the SCC did not appear in the SCC versus emission factor table.*
   Both problems were found to be due to the user's misunderstanding of the EIS/P&R system. The user was advised as to the correct procedure for deleting master file records and for generating emission factor transactions. See problems 29, 49.

6. *The file blocking in the NEDS area source to EIS/P&R conversion program DXNEDSAS and the NEDS point source to EIS/P&R conversion program CXNEDSCV was found not to be the NADB standard of 80 by 4000.*
   Modifications were made to DXNEDSAS and CXNEDSCV to block the files according to NADB standards. This will save computer time when running these programs. The modifications were distributed in EIS/P&R Update 8.
7. *A user with a Burroughs 5550 computer reported that he had encountered non ANS extensions in EIS/P&R programs. He sent the local modifications that were necessary for the programs to run.*
   A continuous search for non ANS extensions in the programs has been carried on. As any extension is found, it is noted and distributed in the next update of that program. All problems noted by the Burroughs user have been corrected and incorporated into the system.
8. *A user reported several problems that he encountered while installing the EIS/P&R system.*
   a) *The SCC versus emission factor table built from the test data had SCC's with no pollutant ID's.*
   b) *The transaction generator program EXTRNGEN destroyed data when used in MODE X.*
   c) *The file maintenance program abended with an OC7.*
   The user was notified that the SCC vs EF table does allow SCC's with no pollutant ID's and that the NEDS data used in the test run contains such SCC's. The EXTRNGEN program was corrected so that pollutant ID's are no longer destroyed. This modification was distributed in EIS/P&R Update 9. See problem 4. The problem with the file maintenance program FXFILMNT involved zeroing fields prior to recalculating emission estimates. The program was corrected and the modification distributed in EIS/P&R Update 10. See Problem 2, 13.
9. *A user reported problems that were encountered while installing the system. The EIS/P&R to NEDS point source conversion program NXNEDSCV was generating duplicate P1 NEDS transactions.*
   The program NXNEDSCV was corrected so that no duplicate P1 NEDS transactions are produced. The modification was distributed in EIS/P&R Update 7.
10. *A user at OSI reported that he had deleted his source library by mistake.*

The IBM utility IEBCOPY was used at OSI to create a copy of the baseline system for the user.

11. *A user reported having troubles incorporating EIS/P&R Update 9 into the transaction generator program EXTRNGEN.*
Upon examination of the problem, it was found that the user had not incorporated earlier updates that also affected the EXTRNGEN program. The first three EIS/P&R updates were sent to the user with the advice that he install these prior to installing Update 9.

12. *The error messages in the file maintenance program FXFILMNT were causing problems.*
The file maintenance program does not print error messages immediately after the transaction or the set of transactions in error. Instead, the next transaction is read and printed prior to the error message. This causes the error message to seem displaced. The user complaining of the problem was advised of this. Also a discussion of the file maintenance error messages was written in Volume 1, #2 (March, 1976) of the CDHS USERS BULLETIN. See also problems 3 and 44.

13. *A user reported that the file maintenance program FXFILMNT was not calculating the emission estimates properly after deleting a machine process.*
The problem resulted from the program FXFILMNT not zeroing out the emission estimates field prior to recalculating it. The program was modified and distributed in EIS/P&R Update 10. See problems 2 and 8.

14. *A user reported that the sort programs SXMSTSRT and IXTRNSRT would run more efficiently when using an IBM version 4 compiler if the sort size were increased from 30K to +999999.*
The sort size was increased to +999999 for the master file sort program SXMSTSRT and distributed in EIS/P&R Update 12. The increase in sort size for the transaction file sorter IXTRNSRT was distributed in EIS/P&R Update 14.

15. *A user reported finding a discrepancy in the headings produced by the summary report program BXSUMARY and the detail list program PXFILPRT.*
Upon examination of the discrepancy in the report headings for the summary report and the detail list report, it was decided that no special update was needed to correct the problem. RTI has been told that the corrections will be made with other modifications under the GSA contract to PRI and

will be distributed at that time.

16. *The summary report program BXSUMARY shows zeros for numeric detail fields where the master file contains blanks. A user complained that this can be misleading.*

    The summary report program BXSUMARY uses the COBOL report writer feature. This feature automatically prints zeros for blank numeric fields. Upon examination of the problem, it was decided to do nothing at this time as the EIS/P&R Quick Look program will replace much of the need for BXSUMARY. The user was notified of this.

17. *The pollutant ID is not a part of the sort sequence for master file transactions. A user reported that this caused a problem because the pollutants are added to the master file in a random order and are printed in that same order on the detail list report.*

    The pollutant ID on the type 13 transaction was added as a part of the sort key in the transaction file sort program IXTRNSRT. This modification was distributed in EIS/P&R Update 14.

18. *A user reported that the documentation was misleading in stating that the pollutant ID must be the lowest level break on the summary report.*

    A letter was sent to the user advising him of how the BXSUMARY summary report program works. The actual breaks in the summary report can be determined by the user at the time the program is run. RTI suggests that the documentation be rewritten at a future time so that it is more user oriented.

19. *Non ANS standard COBOL occuring in the programs DXNEDSAS and AXANEDS caused problems with an IBM VS compiler.*

    The non ANS COBOL statements were replaced in the NEDS area source to EIS/P&R conversion program DXNEDSAS and the EIS/P&R to NEDS area source program AXANEDS and these modifications were distributed in EIS/P&R Update 11.

20. *The transaction generator program EXTRNGEN abended with an OC7 code due to non numeric pollutant ID's.*

    A check was put in EXTRNGEN so that non numeric pollutant ID's would not cause the program to abend. This modification was distributed in EIS/P&R Update 13.

21. *A user reported a problem with the file maintenance program FXFILMNT. When the user tried to delete or retrieve a certain record, he got a message saying that the record was not there. However, when he tried*

to add the record, he got an error message saying that he was trying to create a duplicate record.

Upon examination this was found to be a user problem. A letter was written to the user explaining the correct method to delete records and to readd them.

22. *Suggestions were made for enhancements to the retrieval program. Adding dummy data names, subscripts and the emissions calculation routine from the file maintenance program would facilitate use of the in-line COBOL retrieval feature.*

After discussion, it was found that time and other priorities did not allow for these modifications to be done. RTI suggests that the retrieval program be expanded under a future contract.

23. *A user suggested a change based on a problem he encountered while running the retrieval procedure. An invalid retrieval card was read. The program printed an error messages stating that the run was aborted. However, the job continued processing the remainder of the job, and no valid answer file was created.*

IBM has an extension to COBOL to allow for condition codes to be set. These condition codes can then determine whether later steps of the job stream will be executed or not. However, ANS COBOL does not include condition codes, and other computer systems do not facilitate their use. Therefore, no change was made to the retrieval to incorporate this feature. The user was so advised.

24. *A user encountered an invalid state code on a segment 0 record while the segment 1 and segment 2 records were correct.*

It was discovered that the transactions to create the segment 0 record had been miskeypunched, causing the invalid state code. The user was instructed as to the method for deleting the invalid record and adding the correct one.

25. *When generating a transaction, the EXTRNGEN program outputs a transaction date from the SCC versus emission factor table rather than from the master file. As the master file is updated more frequently than the SCC versus EF table, it would seem better to use the master file date.*

It was agreed that the master file date is more valid to use on the transaction, however the problem did not warrant an update. Under contract 68-02-2525, RTI is redesigning the SCC vs EF table into a

physical file and will rewrite the EXTRNGEN program. The transaction date will be kept under advisement for that time.

26. *A users data generated in EIS/P&R was submitted to NEDS with no NEDS point ID. As the NEDS point ID is part of the NEDS key, a modification should be made to reject a type 11 transaction unless it has a NEDS point ID.*

    The file maintenance program FXFILMNT was modified to reject a type 11 transaction without a valid NEDS point ID. This modification was distributed in EIS/P&R Update 17.

27. *A user had a problem when retrieving segment 3 records from the master file. Only the first line of the segment 3 record was printed out.*

    The retrieval program RXRETRVR was modified to allow for correct retrieval of segment 3 records. This modification was distributed in EIS/P&R Update 15.

28. *Two problems were reported by a user. First, the file maintenance program rejected a transaction that appeared to be correct. Second, in creating the emission factor table, the TXTBLGEN program had abended with an 002 error due to a track overflow problem.*

    The transaction rejected in FXFILMNT was validly rejected and the user was notified as to the user error. The correct procedure for creating the emission factor table was explained to the user. Helpful hints on the table were discussed in Volume 1, #1 (January 1976) of the CDHS USERS BULLETIN. Under Contract 68-02-2525, RTI will replace the SCC vs EF table with a file and will rewrite the programs now using the table. This will eliminate any track overflow problem.

29. *A user reported a problem with the transaction generator program EXTRNGEN not generating segment 2 transactions when the SCC is not present in the SCC vs EF table.*

    The user was advised that the EXTRNGEN program does not generate transactions for SCC not present on the table, and also as to the correct procedure for deleting and readding records. The options used in EXTRNGEN were discussed in Volume 1, #2 (March 1976), and Volume 1, #4 (June 1976) of the CDHS USERS BULLETIN. Under Contract 68-02-2525, RTI will replace the emission factor table with a file and will rewrite the EXTRNGEN program, changing the method transactions are generated. See problems 5, 49.

30. *An Update 14 change to the transaction sorter program IXTRNSRT caused the program to abend with an OC7 whenever columns 78 or 79 of the transaction are blank.*

The user had included a blank transaction in his data by mistake. IXTRNSRT was modified to check for spaces in columns 78 or 79 without abending the program. The modification was distributed in EIS/P&R Update 15. Blank data was added to the test run data for future testing purposes.

31. *The master file sort program SXMSTSRT was found to contain an extra EXIT statement. The EIS/P&R to NEDS point source program NXNEDSCV was generating transactions with invalid pollutants when a pollutant was not coded for segment 1 data. Also in generating P6 NEDS transactions from segment 2 records, transactions with identical SCC codes were generated, which is not allowed in NEDS.*

The program NXNEDSCV was modified to blank out buffers before moving the NEDS data to them. This corrected the problem of invalid pollutants being generated. The modification was distributed in EIS/P&R Update 15. Solutions to the other two problems were identified, however they were held pending the delivery of modifications to the system being done under a GSA contract to PRI.

32. *The transaction sort program IXTRNSRT used spaces in the sort key for fields not present in the master file record. The spaces sorted low on IBM computers using an EBCDIC collating sequence; however, spaces were not sorted low on computers using an ASCII sequence ANS standard COBOL has 'high value' and 'low value' constants that will consistently be sorted either high or low on all computers. These should be used for blanking out fields.*

The IXTRNSRT program was modified to include 'high values' or 'low values' for blank fields in the sort key. This modification was distributed in EIS/P&R Update 15.

33. *The SCC field is part of the NEDS key, therefore, both transactions generated from the NEDS P6 cards and initial EIS/P&R 21 transactions should be edited for a value in the SCC field.*

The file maintenance program FXFILMNT was modified to include an edit check for the presence of the SCC field. This modification was distributed in EIS/P&R Update 17.

34. *Changes were made to the sort programs (Update 12 for SXMSTSRT, the master file sorter and Update 14 for IXTRNSRT, the transaction file sorter) to increase the sort size from 30K to +999999. The initial change was made to increase efficiency on IBM version 4 compiler machines, however it was later found that this did not work on earlier versions of IBM compilers or on non IBM computers.*

    As sort size is an IBM extension to COBOL, the sort size statement will be deleted from the sort programs SXMSTSRT and IXTRNSRT after delivery of the modifications being done under a GSA contract with PRI.

35. *A method is needed to allow for the merging of transactions being entered on cards with those generated by EXTRNGEN.*

    A concatenation program TXCONCAT was written to allow two 80-byte record files to be concatenated. This will allow users to merge card/tape, card/disk, or disk/tape files. The files must be sorted in the transaction sort program IXTRNSRT after merging. The program and the procedure PNRCNCAT to run it were distributed in EIS/P&R Update 20.

36. *The A6 NEDS transaction contains comments concerning the area sources, however, in the NEDS to EIS/P&R conversion program CXNEDSCV, the comments are overridden with a message stating that the transaction was produced by EIS/P&R. It would be desirable for the NEDS comments to be transferred to the EIS/P&R transactions.*

    Time and priorities did not permit this modification to be performed. RTI suggests that it be implemented at such a time as the NEDS A7 card is being incorporated into the EIS/P&R system. See also problem 39.

37. *The file maintenance program FXFILMNT defaults to 100% control rather than the correct 0% control.*

    A modification was made in FXFILMNT to allow for control to default to 0%. The modification was distributed in EIS/P&R Update 18.

38. *Duplicate SCC's are allowed by EIS/P&R, but not by NEDS. It would, therefore, be desirable to have NXNEDSCV the EIS/P&R to NEDS conversion program to sum duplicate SCC's and report them as a single NEDS entry.*

    The solution to this problem was identified and code was implemented on 4/18/77. However, testing and distribution of the modification has been held pending acceptance of the modifications being made by PRI.

39. *The standard 'CREATED BY CDHS' comment is generated when an A6 NEDS card is converted to an EIS/P&R transaction in CXNEDSCV. It would be desirable to use the comment from the A6 card (truncated if necessary).*

Time and priorities did not permit for this modification. RTI has suggested that the modification be implemented when the A7 card is incorporated into the EIS/P&R system. See also problem 36.

40. *The following changes would reduce the number of partitioned data sets needed for the EIS/P&R system:*

a) Incorporate test data into the test run job streams. This would eliminate the need for the test data set.

b) Include the workshop runs in the standard test run series.

c) Incorporate the retrieval and sort generator copy members into the source library.

d) Combine the compiler and load steps into one procedure. This will eliminate the need for an object library.

e) Generate a new installation deck incorporating the above changes.

All copy members used in the retrieval and sort generator programs were added to the source library. The library changes and the PROCS incorporating these changes were distributed in EIS/P&R Update 18. New COBOL compile procedures were distributed in EIS/P&R Update 21. The test data has been incorporated into the run stream and new workshop runs have been added to the original test run series. This expanded test run series is sent with all initial installations and upon request to any users. The installation deck incorporating these changes is in use at the present time.

41. *The retrieval procedure and sort procedures should be modified to use the skeleton programs and the copy members from the source file rather than from the test data set.*

The modifications to the retrieval procedure PNRRETVR and the master file sort procedure PNRSORTR to use the source file were distributed in EIS/P&R Update 18.

42. *Procedures were requested to allow retrievals to be stored in the LOAD library and to then be executed from the LOAD library.*

The procedure PNRRTRCL allows for a retrieval to be created, compiled and link-edited into the load library. The procedure PNRRTRGO executes a

a retrieval program that has been stored in the load library. Both procedures are completed, and it is expected that they will be distributed with the modifications made under the GSA contract to PRI.

43. *A user reported that the retrieval program went into an infinite loop when he was trying to retrieve segment 3 records. The problem occurred when a record did not meet the retrieval criteria.*
The segment 3 record retrieval procedure was corrected in RXRETRVR. This modification was distributed in EIS/P&R Update 19.

44. *A user reported having a problem with the file maintenance program FXFILMNT. A type 01 change transaction was rejected with the error message indicating that a duplicate set was already on file. The set was rejected.*
The problem occured because of the users misunderstanding of the file maintenance error messages. The message actually referred to the set of transactions immediately preceding the 01C transaction. The user was advised as to the method in which the error messages print. A discussion of this problem was printed in Volume 1, #2 (March 1976) of the CDHS USERS BULLETIN. See also problem 3 and 12.

45. *A user deleted his source and test data files.*
A complete system installation tape was sent to the user to replace his deleted files.

46. *Problems were encountered with the retrieval program RXRETRVR when trying to retrieve segment 3 records.*
Since there is no 'retrieve all' option at the present time, the user was advised as to the method the retrieval works. If segment 3 records are desired, the user must specify segment 3 in the retrieval, and then only those plants with segment 3 records which meet the retrieval criteria are retrieved.

47. *A user needed a new copy of the EIS/P&R to NEDS point source conversion program NXNEDSCV.*
A copy of NXNEDSCV was sent to the user.

48. *While trying to run the master file sort program SXMSTSRT, an abend of 0C4 occured. The program had been compiled on an IBM VS compiler.*
The IBM VS compiler has a known bug related to the sorting of variable length records. No fix is reported. The users file was successfully sorted at TUCC, which does not have the VS compiler. A temporary modifica-

tion to the program SXMSTSRT for sorting fixed length records was sent to the user. The problem will be corrected in modifications to the program currently being made under a GSA contract to PRI. See also problems 1 and 52.

49. *A user encountered difficulty in adding an SCC to their file.*
When using the transaction generator program EXTRNGEN, no transaction is generated for an SCC if it does not appear in the SCC vs EF table. The user was advised as to the correct procedure for using EXTRNGEN. The use of EXTRNGEN was discussed in Volume 1, #4 (June 1976) of the CDHS USERS BULLETIN. The procedure will be changed when the emission factor file system is rewritten under contract 68-02-2525 by RTI. See problems 5, 28.

50. *A user had a problem with the JCL in running the retrieval procedures.*
The problems occured because of modifications made to the JCL by the user. The user was notified of the necessary corrections to be made to the JCL.

51. *The file maintenance program FXFILMNT abended with an OC7. A type 13 change transaction was involved.*
Upon examination, it was found that whenever a type 13 change or type 23 change did not have a pollutant ID present on the master file the program abended. The user who encountered the problem tried to fix it, but then obtained duplicate records on his file. A correct modification was sent to the user. However, no update was made as the program is being rewritten under the GSA contract to PRI. See also problem 53 and 54.

52. *A user encountered on OC4 abend when running the master file sort program SXMSTSRT on a VS machine.*
The IBM VS compiler has a known bug related to sorting variable length records. A modification to the program to sort fixed length records was installed at the users computer and the file was successfully sorted. RTI has been told that the program will be rewritten under the GSA contract to PRI. See also problems 1 and 48.

53. *A user reported a problem when two 23 type transactions were processed in a row by the file maintenance program FXFILMNT.*
This problem along with problem 54 are symptoms of a known bug in FXFILMNT. When type 13 or 23 change transactions are processed with invalid data, an OC4 abend occurs. A correction to the problem

was sent to the user. FXFILMNT will be rewritten under GSA contract to PRI, and so no update was issued. See also problem 51.

54. *A problem occurred with an invalid type 23 transaction not showing an error message in the file maintenance program.*
This problem occurred along with problem 53 and is a symptom of a known bug in FXFILMNT. Type 13 and type 23 transactions with invalid data are processed incorrectly. A correction to the problem was sent to the user. Under a GSA contract to PRI, the file maintenance program FXFILMNT will be rewritten and will correct this problem. See also problem 51.

55. *A user encountered a problem with the insertions program KXEMFINS when running on a Honeywell system. An error message stating that the SCC was not present occured, yet the SCC shows up in a dump of the file.*
When contacted, the user was still investigating the problem to determine if it was a user error. Further attempts to have the user foward his run stream, program compiles, error message, etc., have not been successful.

3.2 EIS/P&R Updates Issued During This Contract

EIS/P&R Updates 7 thru 21 were issued by RTI during the course of this contract. Information for these updates, including date, affected programs, and a brief description of the change or problem is given in Table 3. Most of the updates are the result of trouble-shooting problems under this contract. In the description of update problems, references are given to problem numbers used in Section 3.1. Further information on the problems can be found in Section 3.1.

TABLE 3

SUMMARY OF THE EIS/P&R UPDATES
ISSUED DURING THIS CONTRACT

Update Number	Date	Programs	Problems
7	1/16/76	NXNEDSCV	A modification was made so that no duplicate NEDS P1 transactions were generated. See problem 9.
8	2/2/76	DXNEDSAS CXNEDSCV	Blocking factors were changed in the programs to agree with NADB standards. See problem 6.
9	2/9/76	EXTRNGEN	Emission factor transaction generation was corrected (See problems 4 and 8).
10	2/9/76	FXFILMNT	The program was modified to correct the emission estimate calculation. See problems 2, 8, and 13.
11	4/15/76	DXNEDSAS AXASNEDS HXANREPT	Non ANS Standard COBOL code was eliminated from DXNEDSAS and AXASNEDS (problem 19). Blocking factors in HXANREPT were changed to NADB standards.
12	4/15/76	SXMSTSRT	Sort size was increased, See problem 14.
13	4/15/76	EXTRNGEN	A check for non-numeric pollutant ID's was added (problem 20).
14	5/20/76	IXTRNSRT	Pollutant ID was added as part of the sort key (problem 17) and the sort size was increased (problem 14).

TABLE 3 (CONTINUED)

Update Number	Date	Programs	Problems
15	10/13/76	RXRETRVR	RXRETRVR was modified to allow for correct retrieval of segment 3 records (problem 27).
		NXNEDSCV	The NXNEDSCV program was corrected to prevent invalid pollutants from being generated (problem 31).
		IXTRNSRT	IXTRNSRT was modified to include a check for spaces in columns 78 and 79 of the transactions (problem 30) and to substitute 'high values' or 'low values' for blank fields in the sort key (problem 32).
16	11/4/76	RXRETRVR	The program was modified to correct a mistake from Update 15. No two-way memo was involved.
17	12/10/76	FXFILMNT	Edit checks were added for NEDS point ID (problem 26) and SCC (problem 33), both required NEDS fields.
18	1/10/77	FXFILMNT	FXFILMNT was modified to default to 0% control (problem 37).
		Libraries	Changes were made to the EIS/P&R system to reduce the number of libraries needed for the system (problems 40, 41).
19	2/3/77	RXRETRVR	The segment 3 record retrieval procedure was corrected (problem 43).
20	3/1/77	TXCONCAT	The program TXCONCAT and procedure PNRCNCAT were added to allow for merging transactions (problem 35).
21	5/9/77		Procedures were added for one job compiling and link-editing of programs (problem 40).